Final Project

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Sourcing

Premise

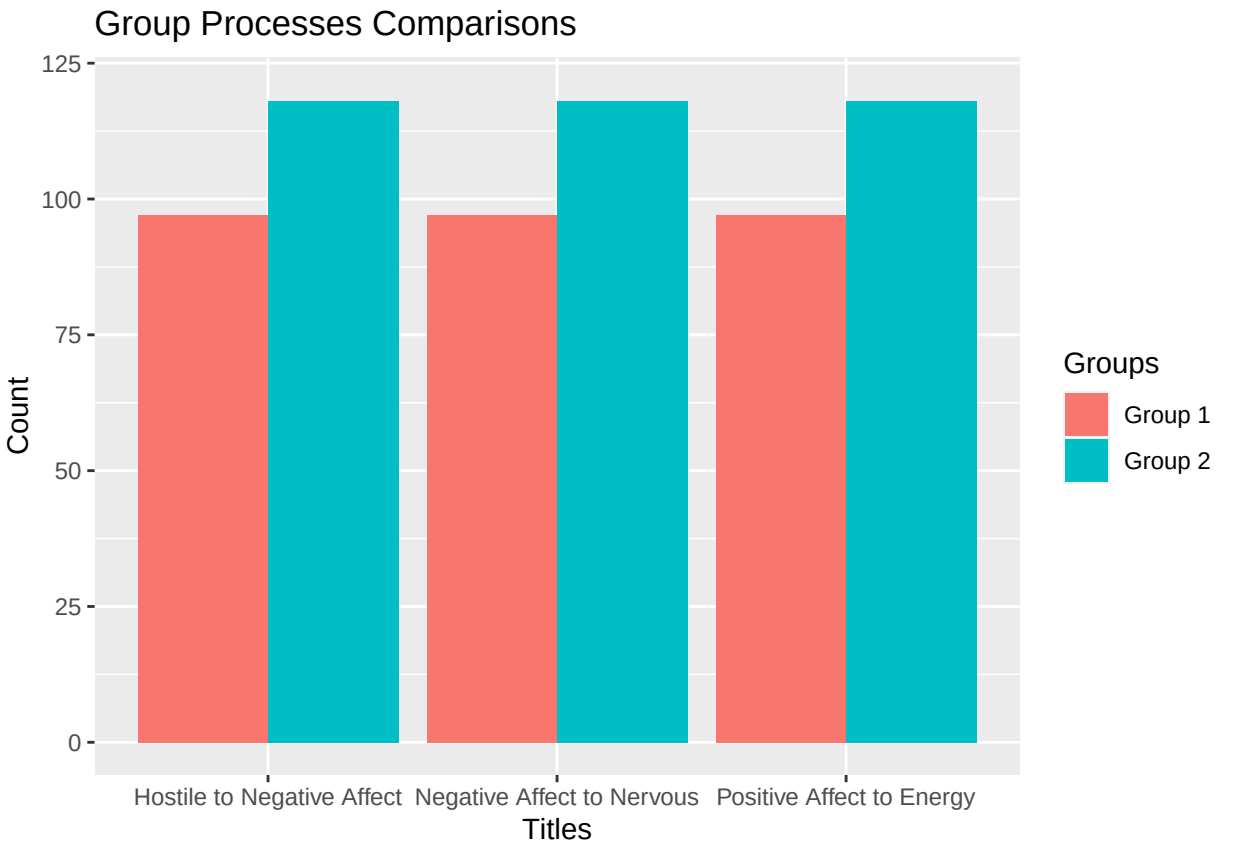
In this report, we conducted an analysis using data from a study assessing individuals' processes. Individuals (N=215) were asked to provide self-report scores for 31 scales representing emotional states (e.g. enthusiastic, angry, sad) at certain intervals of time (at least 60 intervals for each person). Certain patterns of relation were found in the data that indicated the existence of paths between processes that were present in every single participant.

For the study, participants were separated into two cohorts. Our primary intention in this report was to assess the strength of the group-level path estimates for each subgroup for three paths. The three group-level paths analyzed in this report were that of Negative Affect towards Nervousness, Hostility towards Negative Affect, and Positive Affect towards Energy. We want to assess the strength (indicated by beta scores) displayed by each subgroup for these paths.

Bar Graph for Path Estimates in Subgroups

In order to visualize and compare the reported instances of the relevant relationship displayed by each subgroup, we created a bar graph. Due to the consistency of the bar graph, we can identify that Group 1 has less participants than Group 2 and that every participant expressed an analyzable path for these three relationships.

```
library(ggplot2)

ggplot(pathEstimates, aes(x = processes_titles, fill= subgroup_titles)) +
  geom_bar(stat = "count", position = "dodge") +
  labs(title = "Group Processes Comparisons", x = "Titles", y = "Count", fill= "Groups")+
  scale_y_continuous(limits = c(0, 120))
```



Construction of Narcissism Scale

In order to create the Narcissism scale, we assessed Wright's data for the responses to the 31 emotional scales. We decided to sum up the scores in each emotional scale for every time point and average the results . Since each individual had multiple responses corresponding to the differing time points, we then aggregated the narcissism scores with respect to subject ID in order to group all time points to their corresponding individual. With this method, we were able to determine a each participant's narcissism score for the entirety of the study.

```
# Creating new column for average narcissism score #
narcissismIndex$narcissismScale <- matrix(NA,length(narcissismIndex$subj_id),1)

# Calculating narcissism score #
narcissismIndex$narcissismScale <- (rowSums(narcissismIndex[, 9:39], na.rm = T)/31)

####Combining Narcissism Scores by Subject ID ####

narcissism_averages <- aggregate(narcissismScale ~ subj_id, data = narcissismIndex, FUN = mean)
```

Finding Beta Averages for Each Subgroup

For each examined path, we filtered them out into their own subsets and aggregated the data for the average beta values for each subgroup.

```
## hostile to na beta averages
na_beta_subset <- subset(pathEstimates, lhs == "na") #filter for only na paths
na_beta_averages <- aggregate(beta ~ subgroup_titles, data = na_beta_subset, FUN = mean)
```

```r
print(na_beta_averages)
```

```
##   subgroup_titles      beta
## 1         Group 1 0.5375609
## 2         Group 2 0.5802315
```

```r
## na to nervous beta averages
nervous_beta_subset <- subset(pathEstimates, lhs == "nervous") #filter for only nervous paths
nervous_beta_averages <- aggregate(beta ~ subgroup_titles, data = nervous_beta_subset, FUN = mean)
print(nervous_beta_averages)
```

```
##   subgroup_titles     beta
## 1         Group 1 0.430502
## 2         Group 2 0.501273
```

```r
## pa to energy beta averages
energy_beta_subset <- subset(pathEstimates, lhs == "energy") #filter for only energy paths
energy_beta_averages <- aggregate(beta ~ subgroup_titles, data = energy_beta_subset, FUN = mean)
print(energy_beta_averages)
```

```
##   subgroup_titles      beta
## 1         Group 1 0.5906735
## 2         Group 2 0.5559267
```

T-Test Comparing Beta Averages in Subgroups for Each Path

```r
### na beta t-test
t.test(na_beta_subset$beta[which(na_beta_subset$subgroup_titles == "Group 1")],
       na_beta_subset$beta[which(na_beta_subset$subgroup_titles == "Group 2")],
       alternative = c("two.sided", "less", "greater"),
       mu = 0, paired = FALSE, var.equal = FALSE,
       conf.level = 0.95)
```

```
##
##  Welch Two Sample t-test
##
## data:  na_beta_subset$beta[which(na_beta_subset$subgroup_titles == "Group 1")] and na_beta_subset$be
## t = -1.1808, df = 206.2, p-value = 0.239
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1139142  0.0285730
## sample estimates:
## mean of x mean of y
## 0.5375609 0.5802315
```

```r
### nervous beta t-test
t.test(nervous_beta_subset$beta[which(nervous_beta_subset$subgroup_titles == "Group 1")],
       nervous_beta_subset$beta[which(nervous_beta_subset$subgroup_titles == "Group 2")],
       alternative = c("two.sided", "less", "greater"),
       mu = 0, paired = FALSE, var.equal = FALSE,
       conf.level = 0.95)
```

```
##
##  Welch Two Sample t-test
##
## data:  nervous_beta_subset$beta[which(nervous_beta_subset$subgroup_titles == "Group 1")] and nervous
```

```
## t = -1.6529, df = 212.98, p-value = 0.09983
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.15517153  0.01362947
## sample estimates:
## mean of x mean of y
##  0.430502  0.501273
```

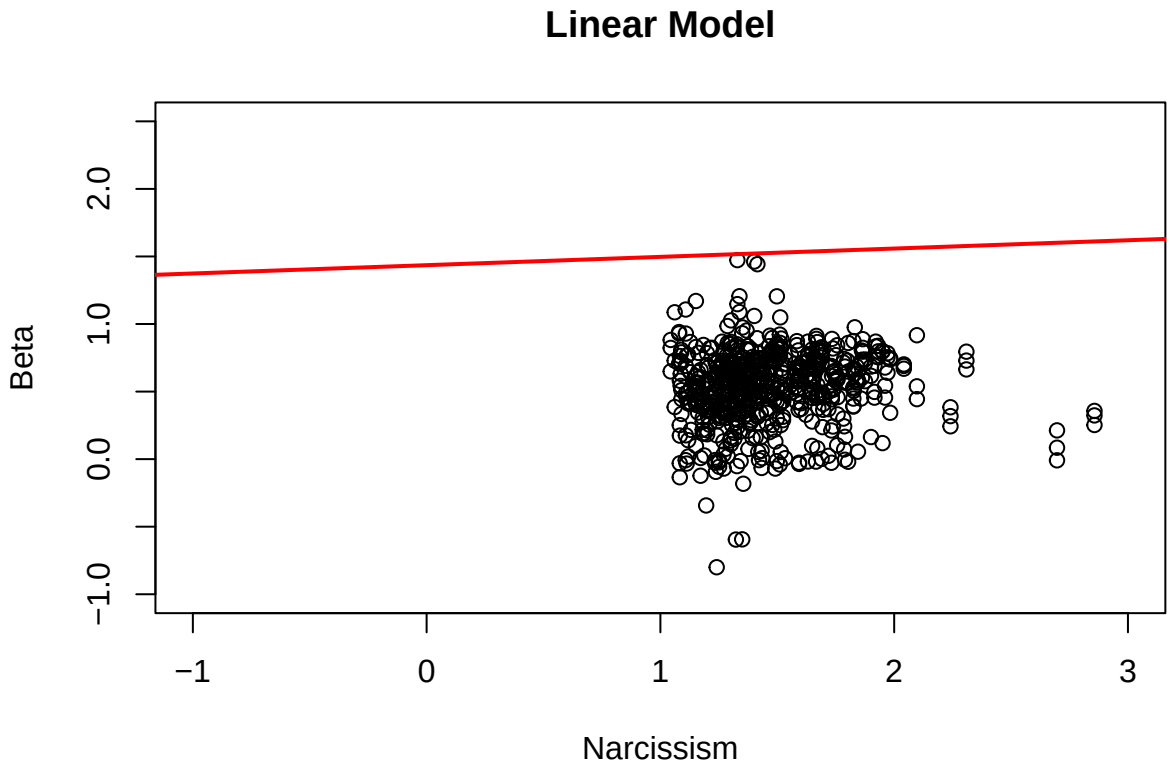
```
### energy beta t-test
t.test(energy_beta_subset$beta[which(energy_beta_subset$subgroup_titles == "Group 1")],
       energy_beta_subset$beta[which(energy_beta_subset$subgroup_titles == "Group 2")],
       alternative = c("two.sided", "less", "greater"),
       mu = 0, paired = FALSE, var.equal = FALSE,
       conf.level = 0.95)
```

```
##
##  Welch Two Sample t-test
##
## data:  energy_beta_subset$beta[which(energy_beta_subset$subgroup_titles == "Group 1")] and energy_be
## t = 1.2537, df = 209.92, p-value = 0.2113
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.01988846  0.08938200
## sample estimates:
## mean of x mean of y
## 0.5906735 0.5559267
```

Constructing Linear Regression Model for Average Beta Scores and Narcissism Scale

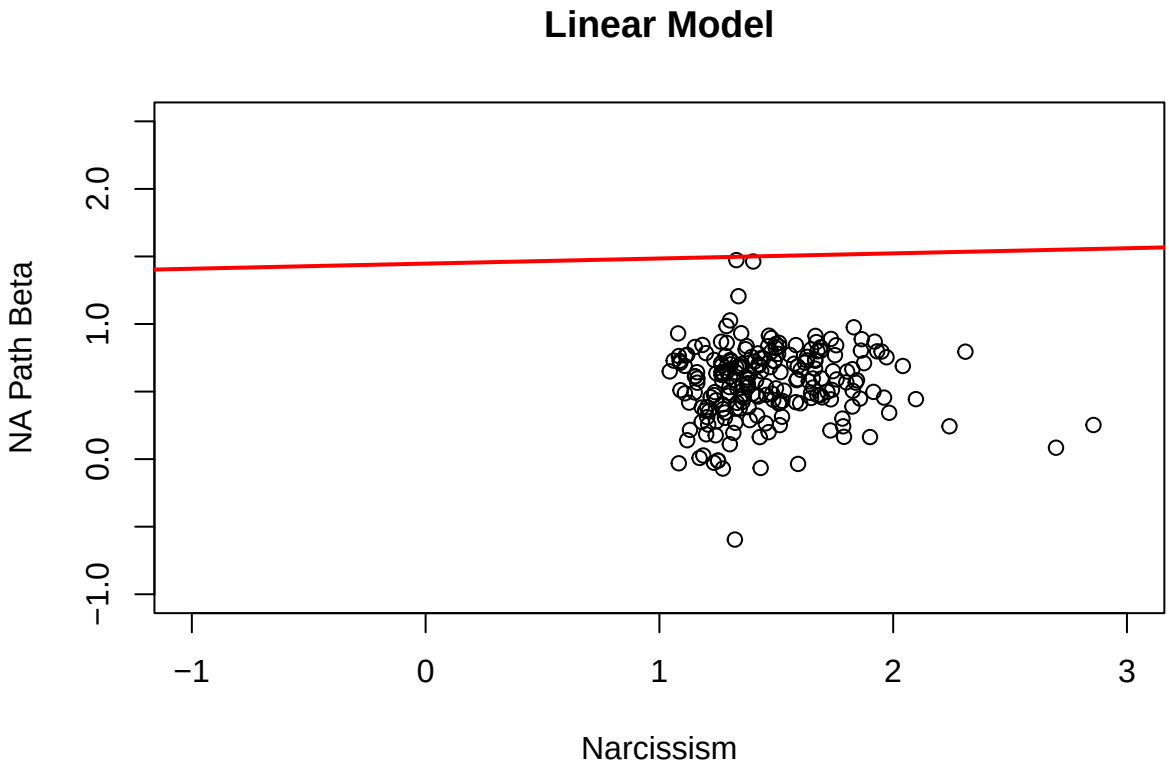
We also wanted to find out whether or not the participants' beta scores would display correlations with their narcissism scores. We conducted linear regression analyses to identify potentially significant relationships between the two calculated variable groups.

```
full_linear_regression <- function(x,y,z,a){
  model <- lm(x~y)
  graph <- plot (x,y, xlab = z, ylab = a, main = "Linear Model",
        xlim= c(-1,3), ylim = c(-1,2.5))
        abline(model, col = "red",lwd=2)
  details <- summary(model)

  return(list(graph,details))
}

full_linear_regression(narc_path_merge$narcissismScale, narc_path_merge$beta, "Narcissism", "Beta")
```



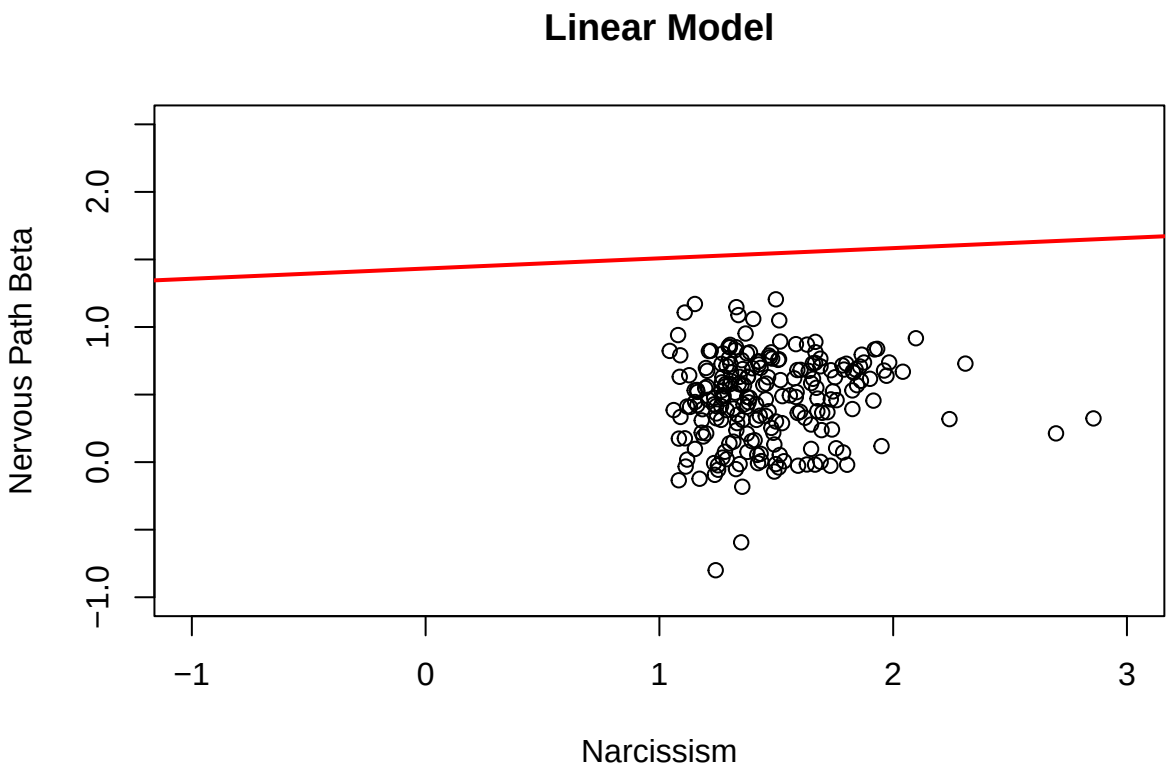

```
## [[1]]
## NULL
##
## [[2]]
##
## Call:
## lm(formula = x ~ y)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.44569 -0.19128 -0.06191  0.17603  1.40569
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.43551    0.02415  59.441   <2e-16 ***
## y            0.06153    0.04035   1.525    0.128
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.277 on 643 degrees of freedom
##   (13 observations deleted due to missingness)
## Multiple R-squared:  0.003602,   Adjusted R-squared:  0.002053
## F-statistic: 2.325 on 1 and 643 DF,  p-value: 0.1278
```

```
full_linear_regression(narc_path_merge_na_path$narcissismScale, narc_path_merge_na_path$beta, "Narcissi
```



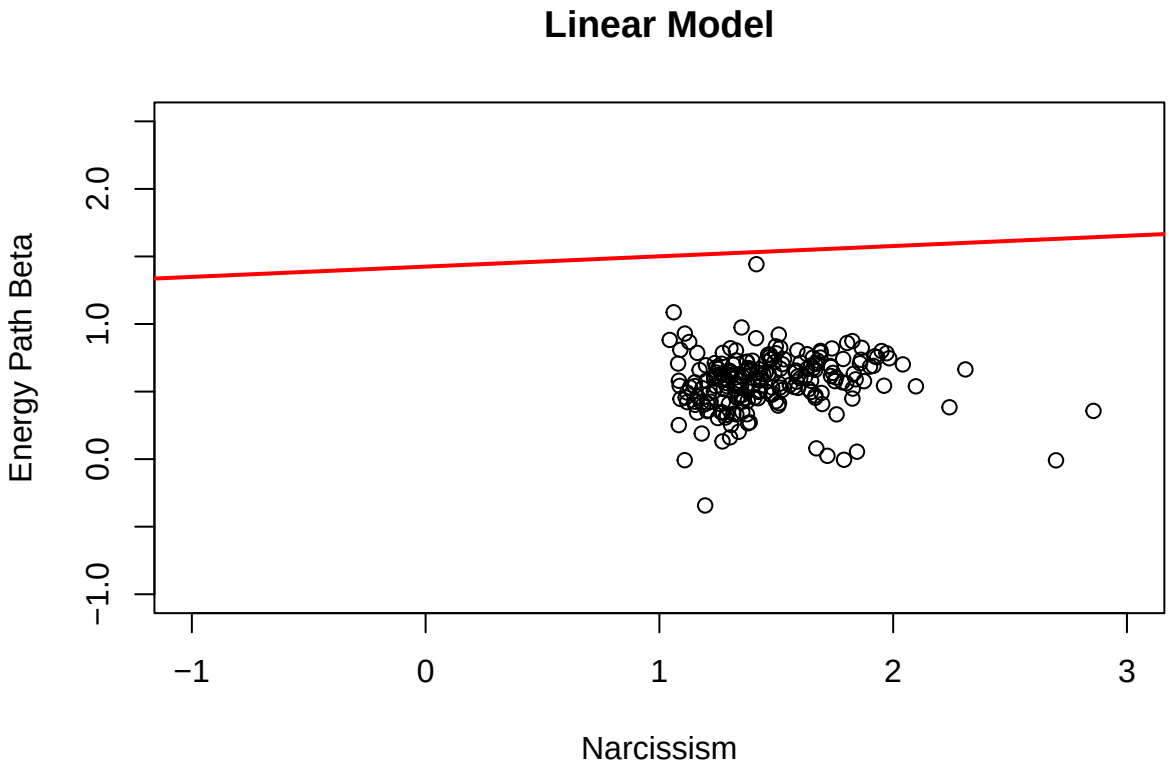

```
## [[1]]
## NULL
##
## [[2]]
##
## Call:
## lm(formula = x ~ y)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4276 -0.1941 -0.0671  0.1771  1.4001
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.44708    0.04460  32.449   <2e-16 ***
## y            0.03794    0.07194   0.527    0.599
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2782 on 213 degrees of freedom
## Multiple R-squared:  0.001304,   Adjusted R-squared:  -0.003385
## F-statistic: 0.278 on 1 and 213 DF,  p-value: 0.5985
```

```
full_linear_regression(narc_path_merge_nervous_path$narcissismScale, narc_path_merge_nervous_path$beta,
```




```
## [[1]]
## NULL
##
## [[2]]
##
## Call:
## lm(formula = x ~ y)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.45100 -0.19442 -0.06204  0.16997  1.39940
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.43292    0.03363  42.607   <2e-16 ***
## y            0.07551    0.05925   1.274    0.204
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2773 on 213 degrees of freedom
## Multiple R-squared:  0.007568,   Adjusted R-squared:  0.002908
## F-statistic: 1.624 on 1 and 213 DF,  p-value: 0.2039
```

```
full_linear_regression(narc_path_merge_energy_path$narcissismScale, narc_path_merge_energy_path$beta, "
```




```
## [[1]]
## NULL
##
## [[2]]
##
## Call:
## lm(formula = x ~ y)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.44791 -0.18827 -0.06575  0.17436  1.40474
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.42485    0.05651  25.215   <2e-16 ***
## y            0.07612    0.09313   0.817    0.415
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2779 on 213 degrees of freedom
## Multiple R-squared:  0.003127,   Adjusted R-squared:  -0.001554
## F-statistic: 0.6681 on 1 and 213 DF,  p-value: 0.4146
```